

Planning and Resource Deployment  
in  
Drought Relief Operations

A Study in Aurangabad District, Maharashtra

1972-73

SUDIPTO MUNDEL

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Introduction

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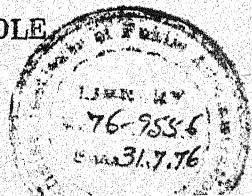
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PLANNING AND RESOURCE DEPLOYMENT  
A STUDY OF DRAUGHT IN MAHARASHTRA

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SECTION I

INTRODUCTION :

The central objective of relief operations during drought is mitigation of immediate distress and prevention of loss of life. Primarily, this takes the form of providing purchasing power through paid employment to the community which has lost its normal source of income in the collapse of agricultural operations.<sup>1</sup> Fortnightly bulletins issued from the affected districts of Maharashtra revealed that during the last agricultural year, July 1972 - June 1973, about 140 crore rupees had been spent in providing employment to the affected people upto a maximum of 50 lakhs per day. Whether indeed this level of operations substantially mitigated distress of the affected community; whether the wages offered were sufficient to maintain the family; whether most individuals seeking relief employment found it; these are some of the important questions investigated in the companion studies on the community, the family etc.

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1. For official thinking on this point see "Report of the Fact Finding Committee for Survey of Scarcity Areas, Maharashtra State, 1973, Vol.1, p.84.

The present study is concerned with a different aspect of these operations. In an underdeveloped economy suffering from an acute scarcity of development resources, and also caught in an inflationary spiral, the dimension of relief policy has to be much wider than merely mitigating immediate distress. This is necessary if the relief operations are to be prevented from causing serious distortions in the economy and aggravating an already existant crisis. Fortunately, this second aspect of relief policy has now been explicitly recognised in governmental policy.<sup>2</sup> In terms of policy, the first question relates to the level of operations while the second relates to the pattern of resource deployment for such operations.

The focus of the present study is on this second aspect of administrative response to the recent drought in Maharashtra. The purpose of the exercise is to derive some policy indicators for planning and efficient resource allocation in similar disaster relief programmes in the future.

In designing an allocation study of this kind, the starting point must, necessarily, be an identification of

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2. See, in addition to the report cited above (1) Scarcity - a Compendium of Government Orders, Govt. of Maharashtra, 1973 (II) The Bombay scarcity Manual (draft) Bombay 1962, (III) B.K. Chougule - Plan of Works to meet the scarcity situation in Aurangabad Division, etc.

the criteria which should have governed the choice of a deployment pattern in the given situation. Government correctly decided that the primary emphasis while choosing the pattern of resource deployment, should be on selecting productive types of relief work. Productive from the point of view of development in general & curbing the recurrence of drought in particular.<sup>3</sup> However, apart from this major objective, there was also a secondary objective which was not always made explicit. This was the minimisation of inflationary pressures unleashed by the operation of the drought relief employment programme (Henceforth DREP).

Operationally these two objectives may be interpreted as two alternative extremising criteria. The first and more important criteria is maximising the long term developmental and scarcity reducing value of the selected work projects. We shall call this the Social Utility Criteria. The other, a short term criteria, is minimisation of the money cost of employment. We shall call this the Cost Efficiency Criteria. The two criteria are not coterminous in the deployment patterns which they indicate and yet they are both relevant to the problem. Accordingly we have adopted both the criteria for our analysis and combined them through the analytical device of lexicographic ordering.

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3. See the documents cited above.

A word about the data. The district selected for this study is Aurangabad and the reference period is the agricultural year, 1972-73. Aurangabad was selected since it was one of the worst affected districts and demanded one of the largest relief operations 1972-73 was the third consecutive year of drought and the worst. In all, some twenty five different agencies were involved in DREP during that year in Aurangabad. Data was collected on various aspects of operations undertaken by each of the agencies and assembled together with the help of the Scarcity Cell which had been especially created to monitor the operations in the office of the district collector.

The analysis which follows has been divided into five parts. In section II we have discussed the broad scarcity plan which was outlined for Aurangabad District. We have also described some exercises which we undertook to interpolate various targets regarding the time profile and sectoral pattern in order to lend greater substance to the scarcity plan frame. In section III we have discussed the short term Cost Efficiency Criteria, the optimal ranking of projects according to this criteria and the rationality of fund deployment, envisaged in the Scarcity Plan, in terms of this criteria. In section IV we have discussed the classification of works according to the more important

Social Utility Criteria and compared the planned allocation pattern to the pattern suggested by this criteria. In Section V we have assessed the actual pattern of deployment of resources in terms of the two criteria, combined together in a system of lexicographic ordering, and examined what impact the planned allocation had on this actual allocation. Finally, in section VI, we have tried to summarise our main conclusions about the desired strategy of allocation under similar contingencies and the relevance of planning in disaster relief operations.

## SECTION II

### THE SCARCITY PLAN FOR AURANGABAD DISTRICT

In keeping with the recommendation of the Scarcity Manual<sup>1</sup> a plan was worked out for all districts in Aurangabad Division and brought together in a Divisional plan which was ready by January 1973.<sup>2</sup> The plan for Aurangabad district had a time horizon of nine months from the initial date of 1st January 1973. The consequences of working out the plan while the drought was underway, instead of doing so as a standing preparation preceding the drought, as suggested in the Scarcity Manual, will be discussed later.

1. See the Bombay Scarcity Manual (draft), Bombay, 1962 (hence forth referred to as Scarcity Manual). Chapter 1. 'Standing Preparation'.
2. See B.K. Chougule - Plan of Works to meet the scarcity situation in Aurangabad Division (henceforth referred to as Scarcity Plan).

In this section we briefly describe the dimensions of the plan.

Employment on different relief works, which stood at 2.68 lakhs on the initial date of 1st January 1973, was to be raised to a peak of almost 5.3 lakhs. However, no detailed time phasing was spelt out in the document. For the present study, which covers the agricultural year July 1972 to June 1973, it has been assumed that the plan envisaged reaching this peak by June 1973 at a constant linear growth rate<sup>3</sup> starting from an initial point at the end of the 6th month of our reference year.

Monthly employment targets have, accordingly, been interpolated using the formula

$$N_{tj} = A_j + B_j (t-6) \quad j=1 \dots 7$$
$$B_j = 1/6 (T_j - A_j) \quad t=7 \dots 12$$

Where  $N_{tj}$  is the average daily employment in  $t$ th month on  $j$ th type of relief work;  $T_j$  is the potential peak employment to be reached in the 6th month of the plan, June 1973, in  $j$ th type of work; and  $t$  indicates the month. The estimates of parameters  $A_j$  and  $T_j$ ,  $j = 1 \dots 7$ , have been taken from Annexure XVI of the Scarcity Plan and adjusted to the

3. The assumption is based on the broad time perspective of the scarcity plan. See scarcity Plan page 40.

nearest thousand. It should be noted that the twelve work categories listed in the Scarcity Plan have been suitably modified to seven categories comparable with the breakdown of work categories in the primary data which was assembled with the help of the Scarcity Cell of the Aurangabad district collectorate.

The monthly employment estimates interpolated from the plan have been reproduced in Table 1.

TABLE 1  
EMPLOYMENT PROJECTIONS OF SCARCITY PLAN

TYPE OF RELIEF WORK	A	B	(figures in thousand)								
			$N_7$	$N_8$	$N_9$	$N_{10}$	$N_{11}$	$N_{12}$	$N_t$		
1. MAJOR & MEDIUM IRRIGATION	2	0.8	2.8	3.6	4.4	5.2	6.0	6.8		28.8	
2. MINOR IRRIGATION	1	3.2	4.2	7.4	10.6	13.8	17.0	20.2		73.2	
3. WELL IRRIGATION ETC.	17	5.5	22.5	28.0	33.5	39.0	44.5	50.0		217.5	
4. SOIL CONSERVATION ETC.	12	10.2	22.2	32.4	42.6	52.8	63.0	73.2		286.2	
5. AFFORESTATION	0	0.4	0.4	0.8	1.2	1.6	2.0	2.4		8.4	
6. METAL BREACING	37	3.8	40.8	44.6	48.4	52.2	56.0	59.8		301.8	
7. ROAD BUILDING	39	1.8	40.8	42.6	44.4	46.2	48.0	49.8		271.8	
TOTAL	108	24.0	132.0	156.0	180.0	204.0	228.0	225.0		1152.0	

Source: B.M. Chougule Plan of works to meet the Scarcity Situation in Aurangabad Division.

Annexure No.XVI pg. 39.

- The estimates of the intercept A are derived from the figures for existing labour strength at the end of December 1972, expressed to the nearest thousand.
- The estimates of B correspond to the slope of the assumed employment expansion path.
- The values of  $N_t$ ,  $t = 7 \dots 12$ , correspond to the interpolated employment estimates of each month, January 1973 to June 1973.
- Monthly Employment has been defined here as the average number of labourers attending per day in a given month.

The planned expenditure for generating the estimated total of about 11.5 lakh man-months of employment during the six month period, January 1973 to June 1973, was Rs.500 lakhs out of a total planned expenditure of Rs.880 lakhs for the entire nine month plan.<sup>4</sup> However, the breakdown of planned expenditure for each type of work is available only for the entire nine month period and not for the first 6 months. To estimate the workwise distribution of expenditure during the first six months it has been assumed that the proportion of planned expenditure during this period out of the planned expenditure for nine months, on each work type, is the same as the ratio of total planned expenditure for first six months to total planned expenditure for nine month in the Scarcity plan.

Thus expenditure on each work type  $j, j = 1, \dots, 7$ , has been estimated using the formula

$$\sum_{t=7}^{12} x_{tj} = \left( \frac{\sum_{t=7}^{12} \sum_{j=1}^7 x_{tj}}{\sum_{t=7}^{12+3} \sum_{j=1}^7 x_{tj}} \right) \sum_{t=7}^{12+3} x_{tj}$$

where  $\sum_{t=7}^{12} x_{tj}$  is the estimate of planned expenditures on work of the  $j$ th type during the period January to June,

4. See scarcity Plan, Annexure XVI pg.39.

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1.3+3

$\sum_{t=7}^{12+3} x_{tj}$  is the planned expenditure on work of the  $j^{\text{th}}$  type during the entire plan period of nine months and  $\sum_{t=7}^{12+3} \sum_{j=1}^7 x_{tj}$  are total planned expenditure on all work types for the periods January to June and January to December respectively. The estimated results are reproduced in table 2 col.3. The assumption underlying this estimation seems reasonable since the summation over all work types of estimated expenditure on each during the first six months of the plan over estimates the total planned expenditure during the period by an error margin of less than 5%.<sup>5</sup>

Table 2, which brings together the estimates of employment and outlay targets of different types of works in Aurangabad District, may be treated as the plan frame of scarcity works for the 6 month period January to June which falls within the reference period of our study i.e. the agricultural year 1972-73. While we are not, at this stage, evaluating this plan, it is necessary to note here some obvious inconsistencies between the stated priorities of the Scarcity Plan and the priorities which emerge from

##### 5. The margin of error

$$\left( \frac{\sum_{t=7}^{12+3} \sum_{j=1}^7 x_{tj}}{\sum_{t=7}^{12+3} x_{tj}} - 1 \right)$$

works out to be 4.5%

TABLE 2  
ESTIMATES SCARCITY PLAN TARGETS

(1)	(2)	(3)	(4)
TYPE OF WORK	ESTIMATE OF PLANNED EMPLOY- MENT (JAN-JUNE)	ESTIMATE OF PLANNED EXP- ENDITURE (JAN-JUNE)	ESTIMATED COST- COEFFICIENT OF EMPLOYMENT (SCARCITY PLAN)
	(000)	(000)	
1. MAJOR & MEDIUM IRRIGATION	29	(2.4)	1420 (2.7) 49.0
2. MINOR IRRIGA- TION	73	(6.1)	3409 (6.5) 46.7
3. WELL IRRIGATION ETC.	218	(18.4)	14773 (28.3) 67.8
4. SOIL CONSERVA- TION ETC.	286	(24.1)	16364 (31.3) 57.2
5. AFFORESTATION	8	(0.7)	682 (1.3) 85.3
6. METAL BREAKING	302	(25.4)	11364 (21.7) 37.6
7. ROAD CONSTRUCTION	272	(22.8)	4261 (8.2) 15.7

Source: Scarcity Plan, B.K. Choumille, Page 39 Annexure XVI

- a) Column (4) gives the estimated cost per men-month of employment i.e., Col.(3) - Col.(2).
- b) Figures in parentheses give percentage to column total.
- c) Column (2) is reproduced from table 1. It gives the values of  $(\sum_{t=7}^{12} N_t)$  for each  $j, j = 1, \dots, 7$ .

the quantitative targets of the plan. In the quantitative plan frame, the bulk of employment creation was targeted for four work categories. Of this, soil conservation and other land developing activities (24.1%) and well irrigation (18.4%) had the highest stated priority; but metal breaking (25.4%) and road construction (22.8%) which were also targeted to provide large shares of total employment were among the lowest in the stated order of priorities<sup>6</sup> because of their low productivity.

In terms of outlays, the largest proportion went to soil conservation etc. (31.3%) and well irrigation etc. (28.3%); but metal breaking also got one of the largest shares (21.7%). Road construction (8.2%) got much less but it was still larger than the shares going to major and medium Irrigation and Minor Irrigation.

In fact, Major and Medium Irrigation and Minor Irrigation, which ranked high in the stated order of priorities were given only a marginal place in the quantitative plan well below metal breaking and road building which were acknowledged to be much less productive.

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6. See Scarcity Plan, page 5.

### SECTION III

#### COST EFFICIENCY OF ALLOCATION

It was pointed out above that any allocation must, necessarily, be evaluated in terms of the specific objectives for which the particular allocation is undertaken. We also noted that for purposes of evaluating the deployment pattern of DREP, the specific objectives of DREP suggest two alternative criteria. In this section we discuss one of these two criteria i.e. the cost efficiency of allocation.

Given the huge burden imposed by DREP on the government budget, it was crucial to ensure that funds were deployed in that direction where the maximum volume of employment could be generated for a given quantum of money. Such a pattern of deployment would imply a strategy of emphasising more labour intensive projects as opposed to less labour intensive projects. This principle had already been incorporated in the Scarcity Manual,<sup>1</sup> which laid down, that labour intensive works, particularly those requiring unskilled labour, should be given priority. The same principle was reflected again in government orders<sup>2</sup>

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1. See Scarcity Manual, page 4.

2. See Scarcity - A Compendium of Government Orders p.20 etc.

and the aims and objectives of the Scarcity Plan which defined/one of its major goals the avoidance of waste and mismanagement of resources.<sup>3</sup>

Operationally this criteria of project selection can be interpreted as one where the priority ranking of a project is made an inverse function of its cost coefficient of employment.

The cost coefficient of employment has been defined here as

$$\theta_j = \frac{\sum_{t=1}^T C_{tj}}{\sum_{t=1}^T W_{tj}}$$

Where  $\theta_j$  is the cost coefficient of employment of the  $j$ th project,  $W_{tj}$  is the number of man months of employment provided on the  $j$ th = project in the  $t$ th = month and  $C_{tj}$  is the expenditure on the  $j$ th project in the  $t$ th month. In other words,  $\theta_j$  measures the money cost of the man month of employment in the  $j$ th type of work.

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3. See Scarcity Plan, Page 3.

It will be recalled that, of the period under study i.e. the agricultural year July 1972 to June 1973, the first six months did not explicitly have a plan and the second six month period had an explicit plan. Consequently, for purposes of comparison, four different estimates of the  $\theta_j$  coefficients have been computed.

$$\theta_j^e = \frac{\sum_{t=1}^{12} c_{t+j}}{\sum_{t=1}^{12} w_{t+j}}, \quad \theta_j^I = \frac{\sum_{t=1}^6 c_{t+j}}{\sum_{t=1}^6 w_{t+j}}; \quad \theta_j^{II} = \frac{\sum_{t=7}^{12} c_{t+j}}{\sum_{t=7}^{12} w_{t+j}}, \quad \theta_j^D = \frac{\sum_{t=7}^{12} x_{t+j}}{\sum_{t=7}^{12} N_{t+j}}$$

For  $j=1, \dots, 7$ .

TABLE - 3

REALISED & PLANNED COST COEFFICIENTS OF EMPLOYMENT

(1)	(2)	(3)	(4)	(5)				
				AGRICULTURAL YEAR 1972-73 (PERIOD I-II)	PERIOD I July-Dec. 72	PERIOD II Jan-June 73	SCARCITY PI Jan - June 73	73
MAJOR & MEDIUM IRRIGATION	47.6	60.4	46.7				49.0	
MINOR IRRIGATION	57.0	49.3	57.4				46.7	
WELL IRRIGATION ETC.	39.8	46.8	39.4				67.8	
SOIL CONSERVATION ETC.	33.8	27.1	38.0				57.2	
AFFORESTATION	20.0	-	20.0				85.3	
METAL BREAKING	40.6	29.8	44.5				37.6	
ROAD CONSTRUCTION	41.1	31.5	45.9				15.7	

Source: (a) Columns (2), (3) & (4) have been estimated from primary data assembled with the help of the Scarcity Cell, Collector Office, Aurangabad Distt.

(b) Column (5) has been reproduced from table 2.

The series  $\theta_j^0$   $\theta_j^I$   $\theta_j^{II}$  are the realised coefficients for the whole year July 1972 - June 1973, Period I from July to December of 1972, which had no explicit plan and Period II from January to June of 1973, which had an explicit plan, respectively.  $\theta_j^P$  is the series of coefficients derived from the employment and expenditure estimates of the Scarcity plan which were computed earlier. The four sets of cost coefficients of employment are reproduced in table 3.

For the three different sets of actual or realised coefficients, we note that the annual series  $\theta_j^0$  is very close to the series of the planned period  $\theta_j^{II}$  even in absolute terms. In terms of ranking these two are identical.

$\theta_j^0$  and  $\theta_j^{II}$  are very similar because Period II bears a much larger weight in the annual series than period I; the magnitude of relief operations having been much larger in the second half of the year. The coefficients  $\theta_j^I$  for the first half of the year are lower than  $\theta_j^{II}$  &  $\theta_j^0$  except for well irrigations & Major and Medium irrigation. Consequently these have a lower rank in the series  $\theta_j^I$  than in  $\theta_j^{II}$  &  $\theta_j^0$ .

Apart from these few differences, however, there is complete consistency in the ranking of projects in the three different series of realised cost coefficients. The broad pattern of priorities which emerges - or what we might call the optimal ranking of different types of works according to the cost efficiency criteria - is the following:

The cheapest sources of offering employment are the different types of land developing activities e.g. soil conservation, nala bunding, ayacut development, and afforestation. The next most inexpensive source of offering employment is well irrigation, desiltation of village tanks etc. This is followed by metal breaking and road building. At the bottom of the ordering comes major and medium irrigation and minor irrigation.

Turning to the Scarcity Plan, two important questions arise. First, is the cost coefficient series implied in the Scarcity Plan frame realistic? Secondly, how does the deployment pattern of the Scarcity Plan compare with its own cost efficiency ranking and the optimal ranking in terms of the realised cost coefficients' series?

As to the first question, there are several important deviations in the series  $\theta_j^P$  as compared to the

other three series of cost coefficients. The coefficient for afforestation is more than 200% greater than the actual. The coefficient for road construction is 100% too small, even if one takes the lowest of the three realised coefficients. The coefficients for soil conservation etc. and well irrigation also turn out to be far too large. Consequently, the cost efficiency ranking thrown up by the Scarcity plan frame is quite different from the optimal cost efficiency ranking computed above. The cheapest sources of employment, according to the plan coefficients, turn out to be road construction and metal breaking. Afforestation, which is in fact the cheapest source of employment, becomes the most expensive in the plan. Major & Medium irrigation or minor irrigation are not the most expensive sources of employment in the plan as in reality, while well irrigation which is in fact one of the cheapest sources, turns out to be one of the most expensive in the scarcity plan.

Coming to the second question i.e. comparing the planned deployment of funds with priority rankings based on the cost coefficients of the Scarcity Plan as well as those based on the cost coefficients realised in DREP, we find an extremely interesting phenomenon. The pattern of fund deployment envisaged in the Scarcity Plan is not

consistent with its own cost-efficiency ranking, but it is quite consistent with the ranking based on the realised cost-coefficients!

There are two exceptions to this consistency<sup>4</sup>, which can be explained independently and we have done so below.

As for the general consistency, it leads to three important conclusions about the formulation of the Scarcity Plan.

- a) It indicates that cost-efficiency was closely adhered to as a criteria in the deployment of funds for DREP as envisaged in the Scarcity Plan.
- b) In adhering to the cost efficiency criteria, the decision makers had at their command, very precise and correct intelligence regarding the relationship between costs and volume of employment to be generated in the different types of relief works.
- c) However, inspite of this intelligence, which was used in planning the deployment of funds, the cost coefficients of employment implied in the Scarcity Plan frame were quite unrealistic. The most plausible explanations of this paradox seems to be that once the basic fund deployment pattern had been chosen according to a rational criteria and laid down in the plan, the approximate peak employment potentials were laid down on some impressionistic basis. No rigourous exercise was done to work out the

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4. See table 4, Column 4.

precise employment profile associated with the chosen pattern of resource deployment in the Scarcity Plan.

The two exceptions to the otherwise close correspondence between the realised cost efficiency ranking and planned deployment pattern are Afforestation and Major and Medium Irrigation. It is easy to see that there are severe locational restrictions on both these types of works. Neither of them can be spread in a large scatter of work sites conveniently located near villages etc., unlike most of the other works. Afforestation can only be undertaken on any significant scale in the restricted pockets of forest land. Major and Medium Irrigation, which consists of permanent construction work, can be taken up at short notice only where the necessary preliminary work e.g. surveys etc. have been done and plans already exist for taking up these works in the near future under normal circumstances.

To sum up, we have seen what should have been the optimal ranking of works according to the cost-efficiency criteria. We have seen also that the cost-efficiency ranking implied in the Scarcity Plan frame was quite unrealistic. Nevertheless, the fund allocation envisaged in the Scarcity Plan adhered very closely to the optimal ranking

and was based upon very precise and correct intelligence regarding the actual cost-coefficients of employment in different works. What we have not done so far is to examine and evaluate the actual deployment pattern during the reference year 1972-73.

Before we can do this however, it is necessary to look into the more important Social Utility Criteria that we mentioned at the beginning.

THE SOCIALISTILITY CRITERIA

It was pointed out earlier that the major objective of DREP, apart from generating the required volume of employment, was to ensure that the manpower employed under DREP got utilised on productive works. That this should have been an important objective is easily understandable if we keep in mind the magnitudes involved in DREP. Even in a single district, in a single year, the operation involved an expenditure of more than a thousand lakh rupees and utilisation of manpower of the order of almost 30 lakh man months. In an underdeveloped country like India it is not difficult to imagine what a collessal waste of developmental resources could result from DREP if it only met the immediate problem of generating relief employment, without attempting to channelise this employment in directions which would be socially useful in the long term. This perspective of long term social benefits would suggest that of any two types of projects A and B, which can generate a certain volume of short term employment at more or less comparable costs, A should be chosen in preference to B if A offers greater long-term social benefits than B. It would suggest, further, that A might be preferable to B even if B involved lower costs. The choice, in this case, would depend on the degree of difference in cost efficiency

between A and B, the magnitude of larger long term benefits to be derived from A, and the relative importance we attach to these differences.

From this point of view, it is useful to classify the different types of works into three different categories.

- A These works which are socially useful in the long term because they not only lead to the creation of substantial developmental assets but also reduce the probability of recurrence of the immediate contingency i.e. drought.
- B Those works which do lead to the creation of some developmental assets but do not significantly help to reduce the probability of recurrence of drought.
- C Those works which do not help to eliminate the basic causes of drought and generate relatively marginal developmental benefits.

The seven major work types in DREP are divided into these three categories as follows:

<u>CATEGORY</u>	<u>BENEFITS</u>	<u>TYPES OF WORK</u>
A (Irrigation)	Creating developmental assets. Reducing the causes of recurring drought.	1) Major & Medium Irrigation 2) Minor Irrigation 3) Well Irrigation
B (Land Improvement)	Creating developmental assets	4) Soil conservation etc. 5) Afforestation
C (Others)	Limited development asset creation	6) Metal Breaking 7) Roads

Clearly, in terms of long term developmental benefits a high premium would have to be attached to irrigation works of various types in category A for the dual purpose which they serve. Not only does irrigation catalyse agricultural development by increasing production to much higher levels; but it also stabilises agricultural production at this higher level by reducing the probability of drought.

It is important to stress that this high developmental benefit of irrigation was quite clearly perceived by government which made irrigation the core of the states 5th five year plan. The Draft Outline of the state plan states "... the government intends to give a high priority to irrigation projects for stabilisation of agriculture at an appreciably higher level. More than 25% of the Fifth Plan Outlay is proposed for irrigation Major, medium and

minor ... while selecting new projects care will be taken to ensure the benefits of the project go to (a) those areas that are chronically drought affected and require insulation against frequent drought...<sup>5</sup>.

The special suitability of irrigation works as a source of relief employment during drought was explicitly recognised in the Scarcity Manual which specified that as an anti-famine measure, preference be given to irrigation works.<sup>6</sup> The same perspective was reflected in government orders during the drought which placed irrigation works at the top of the priority ranking.<sup>7</sup>

At the district level, the Fifth Five Year Plan for Aurangabad points out that the dual benefit of irrigation is especially relevant in Aurangabad which has large chronically drought affected areas in the western part, while its other regions are also drought prone.<sup>8</sup> In order to achieve the targeted 7% rate of growth, the plan states, there has to be a breakthrough in agriculture the critical instrument for which is irrigation.<sup>9</sup> Accordingly, the District 5th Five Year Plan has a target of increasing the

5. The draft outline of Fifth Five Year Plan, Maharashtra State, p.5.

6. Scarcity Manual p.4-6.

7. See Scarcity - A Compendium of Government orders; especially Vol. II p.19-21.

8. See Fifth Five Year Plan (1974-75 to 1978-79). District Planning Board, Aurangabad District, 1973 p.46. Henceforth District Plan.

9. District Plan p.18.

irrigated portion of total cultivated area from 7.8% to 16% in order to get a corresponding 20% to 25% increase in agricultural production.<sup>10</sup>

Furthermore, out of the different types of irrigation works in category A well irrigation has been by far the most important in Aurangabad District, accounting for 88.55% of the total irrigated area of 98,335 hectares upto 1971.

TABLE - 4

AREA UNDER IRRIGATION (1970-71)

TYPE	AREA COVERED
Canals (Major & Medium)	10,547 hect.
Tanks (Minor)	342 hect.
Wells	87,078 hect.
Other	368 hect.
<b>TOTAL :</b>	<b>98,335 hect.</b>

Source: District Fifth Five Year Plan, Aurangabad p.45.

It is odd that this clear recognition of the critical importance of irrigation & its special suitability as a scarcity work did not get reflected in the listing of priorities of the Scarcity Plan itself. The Scarcity

Plan, in its statement of priorities, gave top priority to works of category B. i.e. land improvement activity, of which the main item was soil conservation.

It is true that soil conservation, which is important for retaining productivity of the soil, as well as the other land developing activities like nala bunding, ayacut development and afforestation are important for agriculture. It is also true that in the drought situation there was great scope for undertaking these works. At the end of 1972 there was still some 4.6 lakh hectares of bundable land<sup>11</sup> and these were conveniently dispersed around work sites and villages, such that relief labourers would not have to travel long distances. There was also available about 380 kilometers of nala to be banded<sup>12</sup> and about 48,000 hectares of land for ayacut development in the command area of the Jayakwadi Project.<sup>13</sup> Finally pre-monsoon work for land conserving afforestation could be undertaken on 87,698 hectares of land.<sup>14</sup>

Nevertheless, these different types of land improving works do not help significantly to eliminate the causes of drought. Secondly even their contribution to

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11. District Plan, Aurangabad, p.45.

12. Scarcity Plan, p.6.

13. Scarcity Plan, p.7.

14. District Plan, Aurangabad, p.66.

raising agricultural production is nominal compared to the sharp impact of irrigation. Consequently, in terms of Social Utility or long term developmental benefit, these works of category B must be placed well below the works in Category A.

At the bottom of the Social Utility ladder must come the works of Category C i.e. Metal Breaking and Road Building. These are not totally unproductive, as made out in mass media during the relief operations. But it is certainly true that much of the metal broken cannot be economically used in road or rail construction in another location & that roads with only the earth work done under scarcity relief cannot be used once they are exposed to the monsoon.

In short if works of category C are productive their productivity is very marginal - especially when compared to the works of Category B & Category A. Consequently, the Scarcity Plan itself listed road building & metal breaking as having the lowest priority<sup>15</sup> and stated clearly that these should be taken up only as a last resort when nothing else was available.<sup>16</sup>

Turning to the allocation patterns envisaged in the Scarcity Plan, it makes very little sense in terms of the

15. Scarcity Plan, p.5.

16. Scarcity Plan, p.12.

Social Utility criteria if we consider the employment pattern derived from the plan (See Table 6). Category C, the worst of the three, was targeted to provide almost half of the total employment to be generated by DREP whereas the other two categories were each targeted to provide about a quarter of the total employment to be generated. As we pointed out above, however, there are some inconsistencies between the envisaged investment pattern and the employment figures in the Scarcity Plan. Under the circumstances, it is the expenditure patterns which should be treated as the authentic statement of intent in the plan because it is the deployment of funds which constituted the direct instrument variable for the decision makers in DREP. Moreover, as we saw in the last section, it was the fund deployment plan which was carefully worked out using precise and accurate information about different work types and employment figures were evidently tacked on some impressionistic basis once the basic choice of a fund deployment pattern was made. Going by the intended expenditure pattern in the Scarcity Plan, the plan seems more consistent with our Social Utility criteria, but this consistency is limited. In the Scarcity Plan frame each of the three categories gets about one third of the total outlay-with category A getting marginally more at the cost of category C.

In view of the very major differences in long term social utility of the different categories, one would expect by this criteria that the bulk of expenditure should go to A, less to B and only a small allocation to C as a last resort when employment generation opportunities were not available in other categories. Evidently, such a pattern was not envisaged in the plan.

It turns out therefore that the expenditure programme envisaged in the Scarcity Plan for DREP adhered strictly to the criteria of cost efficiency, but it did not seriously adopt the criteria of long-term Social Utility. Yet it is the latter criteria which was clearly the more important objective and the one which, in principle, was given much greater emphasis in the Scarcity Manual, the Scarcity Plan, the compendium of Government orders and other similar documents.

#### SECTION V      THE REALISED PATTERN OF DEPLOYMENT

We have reached, finally, the question of evaluating the realised pattern of resource deployment in DREP and examining what impact the Scarcity Plan had on this realised pattern of deployment in DREP. To recollect, we have discussed above the main criteria of resource deployment, i.e. long term social utility, and the secondary criteria, i.e. minimisation of money costs, which the government had

in mind while allocating resources for DREP. We have also spelt out what should have been the priority ranking of different types of works according to these alternative criteria. In evaluating the Scarcity Plan in terms of these criteria, it turned out that the quantitative frame was neither fully worked out nor internally consistent. Furthermore we found that it adhered very closely to the secondary Cost Efficiency criteria, and not to the more important Social Utility criteria, in the deployment patterns that it envisaged. This led to a deviation from the stated priorities of DREP and in that sense the Scarcity Plan was not optimal.

In order to evaluate the optimality, or otherwise, of the realised deployment patterns of DREP, it is necessary to bring together the two criteria spelt out above and evolve one, unified system of priority ranking for the different types of relief works. For this purpose we have adopted a device called Lexicographic ordering. In its essentials, this ordering system is fairly simple. Where alternatives have to be ranked not according to one single preference scale but two or more, the priority between preference scales itself is ranked. Each alternative is then given its appropriate place along a series where all ranks along one preference scale follow all other

ranks along a higher priority preference scale. This system applies, for instance to the ordering of words in a dictionary.

For our problem, the application is a simple two dimensional one and quite clear. The primary ordering must be according to the more important criteria (an explicit choice in being made here based upon the stated thinking of government) of long term Social Utility. Thus, all works in category A will precede those in category B and those in category B will precede those in category C along the x - axis (see diagram). Within each category A, B, C, those works with a lower cost coefficient of employment will precede (be closer to the origin than) those with a higher cost coefficient of employment along the y - axis.

DIAGRAM I  
LEXICOGRAPHIC RANKING OF WORK CATEGORIES

01

(2)			
(1)			
(3)			
(00)	A	B	C
			Soc. Utility

KEY:

1. Major and Medium Irrigation
2. Minor Irrigation
3. Well Irrigation
4. Soil Conservation
5. Afforestation
6. Road Construct
7. Metal Breaking

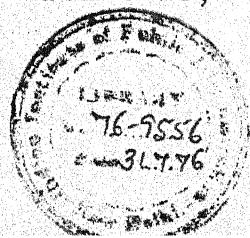
$\theta$  Cost coefficient of employment

Rank increases towards origin along both axis.

From our two-dimension, lexicographic, ordering we find the following optimal ranking of works:

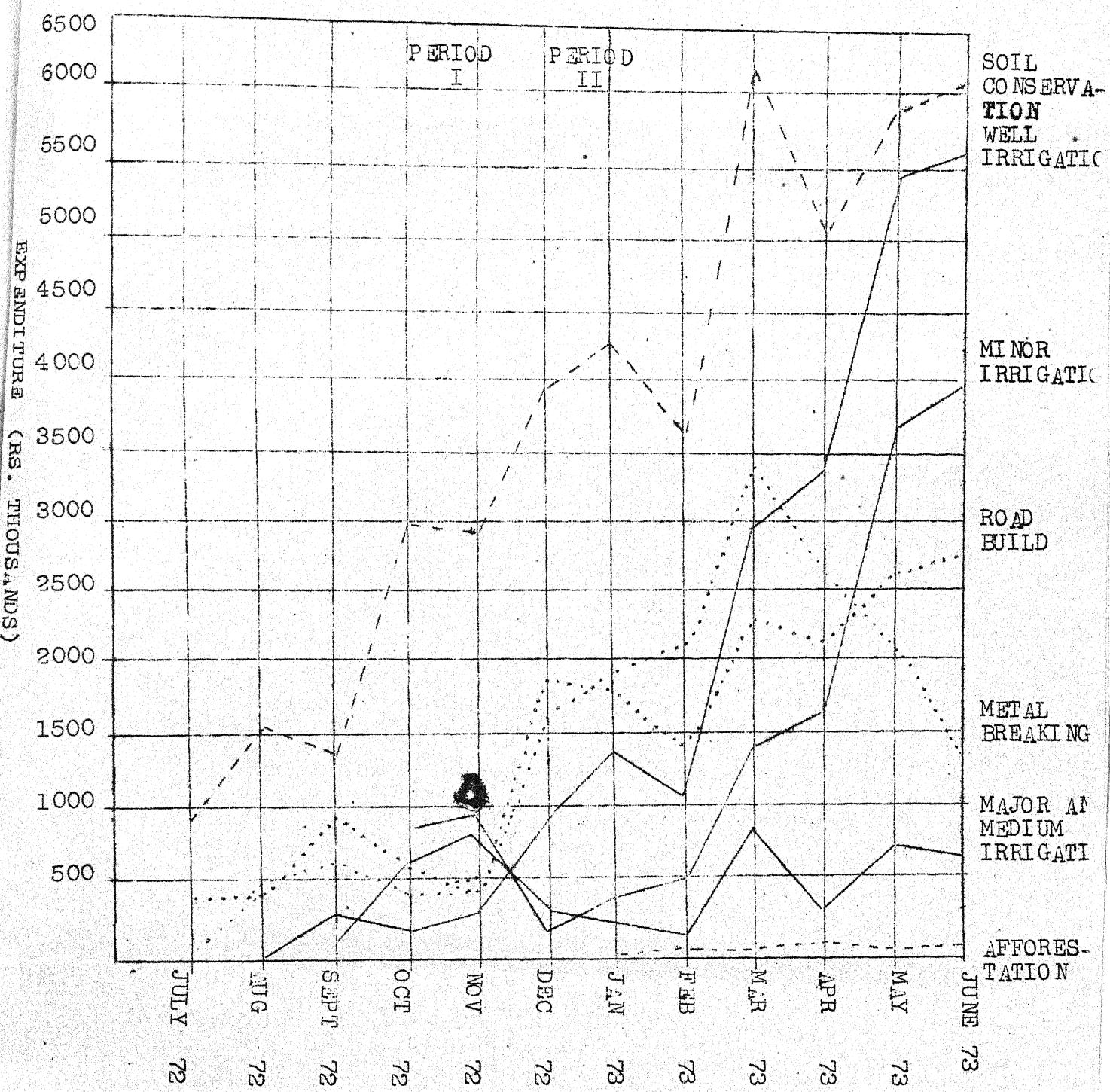
FIRST : Well Irrigation  
SECOND : Major and Medium Irrigation  
THIRD : Minor Irrigation  
FOURTH : Afforestation  
FIFTH : Soil conservation  
SIXTH : Metal Breaking  
SEVENTH : Road Building

Two exceptions, must be noted. We had pointed out above that Major and Medium Irrigation and Afforestation could only be taken up in limited areas for constraints other than shortage of funds. Consequently, in our evaluation of the actual pattern of fund deployment a disproportionately low allocation to these two work types, compared to their rank, need not be regarded as a major deviation from the optimal deployment. Apart from this, however,



the optimal distribution of outlay between different work categories should have followed the above priorities.

The actual deployment of resources in DREP during the entire agricultural year 1972-73 presents a rather interesting picture. For reasons mentioned above afforestation got a negligible allocation. Major and Medium irrigation was also given a very marginal role in the entire DREP operations with its share of total allocation fluctuating about the five lakh mark but never exceeding eight or nine lakhs. We have disregarded them in the subsequent analysis. For the remaining five types of major work heads, the agricultural year can be divided into four phases in terms of deployment behaviour. In the first phase, up to the end of October, the operations remained at a fairly low level. There was less than 10 lakhs a month outlay on each type, except in the case of soil conservation. Soil conservation was the dominant activity during this period, its monthly outlay rising from about ten lakhs to almost thirty lakhs. Thus, category B dominated and during most of this period outlay on even the worst category of works C exceeded outlay on the best category A. November represents a second phase when there was a sharp increase in relief operations after it became evident that the Rabi Crop would also fail. Soil conservation remained



CATEGORY A —

CATEGORY B - - - - -

CATEGORY C ....

dominant, with more than twice the outlay on any other work. Metal breaking and road building outlay also increased and remained well above outlays on irrigation works, which actually decreased. The third phase, December-January, represented a stable period in which most operations continued at a level slightly below the level reached during the previous phase. This was the period during which the Scarcity Plan became operational and its impact was felt immediately from the beginning of the fourth phase i.e. February. In this fourth phase, again, a sharp increase occurred from February onwards, raising the overall operations of DREP to an unprecedented level which dwarfed the level of operation in November. This new increase, significantly, was sharpest for irrigation works of category A, where it continued right upto the end of June. For the other works, there was either a tapering off or a sharp fall after a peak reached in March. Consequently there was a turning point during this fourth phase at which the deployment pattern was completely changed. Individually, outlays on minor and well irrigation, which had earlier remained smaller than outlay on C category works, now exceeded these by a hundred to four hundred percent and well irrigation outlay came close to the outlay on soil conservation. However, the latter still remained the largest. As categories, the outlay on category A now not only exceeded outlay on category C but also, for the first time, the outlay on Category B.

PLANNED & ACTUAL EXPENDITURE PATTERN

TYPE OF WORK	WHOLE YEAR (July 72-June 73)	PERIOD I (July 72-Dec. 72)	PERIOD II (Jan. 73-June 73)	SCARCITY PLAN (Jan. 73-June 73)	
				(RS. thousands)	(RS. thousands)
1) Major & Medium Irrigation	3190	( 2.8 )	483	( 2.1 )	2707 ( 3.0 )
2) Minor Irrigation	11864	(10.3 )	394	( 1.7 )	11470 (12.6 )
3) Well Irrigation etc.	21300	(18.5 )	1544	( 6.5 )	19756 (21.7 )
A: Total (1)+(2)+(3)	36354	(31.6 )	2421	(10.3 )	33934 (37.2 )
4) Soil Conservation	44493	(38.7 )	13499	(57.0 )	30994 (34.0 )
5) Afforestation	220	( 0.2 )	—	—	220 ( 0.2 )
B: Total (4)+(5)	44713	(38.9 )	13499	(57.0 )	31215 (34.2 )
6) Metal Breaking	17275	(15.0 )	4410	(18.6 )	12865 (14.1 )
7) Road Construction	16553	(14.4 )	3342	(14.1 )	13211 (14.5 )
C: Total (6)+(7)	33828	(29.4 )	7752	(32.7 )	26076 (28.6 )
<b>TOTAL: A+3+C</b>	<b>114895</b>	<b>(100)</b>	<b>23672</b>	<b>(100)</b>	<b>91225 (100)</b>
					<b>52273 (100)</b>

Figures in parenthesis give percentage to column totals.

How does this deployment pattern compare with the optimal priority ranking which we derived earlier? Taking the year as a whole, we find that the middle ranking, land improving works of category B got almost 40% of the total outlay, whereas the top-ranking, highly productive works of category A got an equal share of about 30% of total outlay with the bottom ranking unproductive works of category C. Individually, the picture is still worse. Minor Irrigation, one of the highest ranked works, got only 10% of the total outlay while unproductive items like road building and metal breaking, at the bottom of the ranking, got as much as 15% each. One might argue that this was justified, the lexicographic ranking notwithstanding, since the cost coefficient of minor irrigation is much greater than that of the works in category B and C. But even this dubious justification is not there in the case of well irrigation which has a cost coefficient which is actually lower than that of works in category C and only marginally greater than that of soil conservation in category B. Inspite of its top rank, well irrigation got only 18.4 per cent of total outlay while soil conservation with a much lower rank, got 38.7%. In other words, the deployment of resources for the year taken as a whole was not anywhere near optimal in terms of the Government's own stated objectives.

However the annual picture alone is not at all adequate, especially for measuring the impact of planning since we saw above that important changes in the deployment pattern occurred during the year.

Consequently the entire reference period, i.e. the agricultural year 1972-73, has been split up into two equal periods. Period I, from July 1972 to December 1972, during which time the scarcity plan was not in operation & Period II, from January to June 1973, during which the scarcity plan was in operation. Comparing the two periods, we can estimate what impact the introduction of a Scarcity Plan had on the performance of DREP. The comparative allocation between Period I and Period II has been reproduced in Table 5, together with the allocation envisaged in the Scarcity Plan.

It must be noted, first of all, that there were significant differences in the allocation pattern between period I and period II and that the allocation during the later period was almost identical to the allocation envisaged in the plan. The Scarcity Plan envisaged a distribution of outlay where the best category of works, A, got 7.5% of the total, the second best category B got 32.6% of the total and the worst category C, got 29.9% of the total. In the actual allocation of period II the distribution between these categories was 37.2%, 34.2% & 28.6%

TABLE - 6

## PLANNED &amp; ACTUAL EMPLOYMENT PATTERN

TYPE OF WORK	WHOLE YEAR (July 72-June 73)	PERIOD I (July 72-Dec. 72)	PERIOD II (Jan. 73-June 73)	SCARCITY PLAN	
				Man months (000)	Man months (000)
1) Major & Medium Irrigation	66 ( 2.0 )	8 ( 1.0 )	58 ( 2.7 )	29	( 2.4 )
2) Minor Irrigation	208 ( 7.0 )	8 ( 1.0 )	200 ( 9.2 )	73	( 6.1 )
3) Well Irrigation etc.	535 (18.0)	33 ( 4.1 )	502 (23.2)	213	( 18.4 )
A: Total (1)+(2)+(3)	810 (27.3)	49 ( 6.1 )	761 (35.1)	320	( 26.9 )
4) Soil Conservation	1315 (44.3)	499 (62.4)	816 (37.7)	286	( 24.1 )
5) Afforestation	11 ( 0.0 )	—	11 ( 0.1 )	8	( 0.7 )
B: Total (4)+(5)	1325 (44.7)	499 (62.4)	828 (38.2)	294	( 24.7 )
6) Metal Breaking	420 (14.2)	140 ( 17.5 )	280 ( 12.9 )	272	( 22.8 )
7) Road Construction	408 (13.8)	112 ( 14.0 )	296 ( 13.7 )	302	( 25.4 )
C: Total (6)+(7)	829 (28.0)	252 ( 31.5 )	577 ( 26.6 )	574	( 48.3 )
TOTAL : A+B+C	2966 (100)	800 (100)	2166 (100)	1188	( 100 )

Figures in parenthesis give percentage to column totals.

respectively. Clearly, the plan did not merely remain a statement of intent but was effectively implemented in the sense that the actual allocation was brought completely in line with the allocation envisaged in the plan.

Moreover, in terms of the ranking derived earlier, it turns out that the allocation during Period II was much closer to the optimal allocation than the allocation during Period I. Of course as we saw earlier, the Scarcity Plan was heavily biased towards the short term Cost Efficiency Criteria rather than the more important Social Utility criteria. Consequently, we do not find as large an allocation to the best category of works A as would be desired optimally in either the Scarcity Plan or the actual allocation which it generated in Period II. Similarly, there is a much larger allocation to the second best category B, and to the worst category C, than would be desired optimally. In fact, as we have just seen, all the three categories got almost equal shares of a third each with category A and B being favoured very marginally at the cost of category C. Nevertheless, there is no gainsaying the fact that there is a very significant improvement in Period II as compared to Period I. The share of irrigation works in Category A went up from a meagre 10.3% in Period I to 37.2% in Period II. Most of this increase occurred at the cost of category B, whose share decreased from as much as 57.0%

to 34.2%. The share of category C also decreased slightly from 32.7% to 28.6%. In other words, the Scarcity Plan inspite of all its limitations, did serve as an effective instrument in bringing the deployment patterns of Period II much closer to the optimal pattern than the unplanned allocation of Period I.

Our analysis, throughout has been formulated in financial terms or in employment magnitudes. While the dimensions were dictated by the nature of the problem which we have tried to analyse, it is necessary to atleast briefly refer to the physical profile of DREP in order to complete the picture.

Unfortunately, periodic estimates of physical achievements in DREP were not available. Hence it is not possible to reconstruct the change, between Period I and Period II, in the pattern of physical achievement which must have been generated by the change in the financial deployment pattern.

What we do have, instead, is a cumulative estimate of the total physical achievement of DREP during the entire period of drought i.e. January 1971 to September 1973 (see table 7). The most striking feature emerging from these estimates is the very large number of projects, particularly for the different types of irrigation works in Category A, which were started but not completed. Our data

TABLE - 7

CUMULATIVE PHYSICAL ACHIEVEMENT ON SCARCITY  
WORKS JANUARY 1971 to SEPT. 1973.

S.No.	WORK TYPE	NUMBER OF PRO- JECTS TAKEN UP	PHYSICAL ACHIEVEMENT
1.	1.1 Canals excavated	21	16 Projects completed 51.30 Km. excavated
	1.2 Canals repaired	24	24 Projects completed
2.	2.1 Irrigation Tanks	59	1 completed
	2.2 Percolation Tanks	158	3 completed
	2.3 Village Fonds	149	93 completed
	2.4 Desilting of Tanks	184	184 completed
3.	3.1 Community Wells	4313	1105 struck water
	3.2 Tubewells drilled	37	16 successful & fixed with pumps
	3.3 Old Wells deepend	901	277 Wells struck water
	3.4 Public Wells desilted	-	-
	3.5 Private Wells desilted	24	24 completed
4.	4.1 Soil Conservatio. (Bunding)	1007	283 450 Hectors covered
	4.2 Ayacut development	99	4912.31 SUD covered
	4.3 Nala Bunding	96	85 completed
5.	5.1 Afforestation	39	120,000 bunches dug to cover 725 Hectors
6.	6.1 Metal Breaking	381	929033 cum. metal collected
7.	7.1 Roads	547	4181 Km. Completed
	7.2 Trenches	21	25,706 trenches dug.

: S. Jambunathan - Scarcity in Aurangabad District  
 (Mimeographed) note presented at Scarcity Meeting,  
 Commissioner's Office, Aurangabad on 6th September,  
 1973. Statement B.

pertains to the cumulative achievement upto the last month of the DREP operations. Adding to this quantitative picture the widespread belief that even much of the work which was completed was of low technical quality, it would appear that our analysis in terms of financial magnitudes has, if anything, underplayed the negative consequences of inadequate planning.

## SECTION VI

### CONCLUSION: A FRAMEWORK OF CONTINGENCY PLANNING

A few salient points emerging from the foregoing analysis need to be emphasised here. First of all it has to be asserted that a certain cynicism which exists about the relevance of planning in relief operations like DREP, and the idea that there was no real planning at any time for DREP, is completely unjustified. These theories are dramatically falsified by the sharp changes in the deployment pattern which occurred after the Scarcity Plan came into operation. The new deployment not only followed the broad patterns laid down in the Scarcity Plan but also kept to the specific quantitative details of the Plan.

Secondly, the change which came about brought the new deployment pattern closer to the optimal pattern, without ever attaining it. This deviation from the optimum followed directly from the short sightedness of the plan. Even

though, in principle, the long term Social Utility criteria was stressed in the plan, its quantitative frame actually followed the relatively less important criteria of Cost Efficiency. Thus suboptimality was built into the plan itself.

Moreover, we noted that the plan was not worked out as an internally consistent and complete document. While the financial outlays were made on the basis of accurate information regarding the cost coefficients of employment in different types of works, the employment implications were never carefully worked out. This led to inconsistency between the envisaged employment and expenditure targets.

The causes of such inoptimality and internal inconsistency are not difficult to trace. The Scarcity Plan was not a plan worked out in advance. It was a plan which was formulated under extreme stress while the administration was already facing the crisis. It is easily understandable that in these circumstances a plan might not be formulated rationally and suffer from excessive influence of the immediate problem. Hence the pre-occupation with holding down costs to a tolerable level while the magnitude of operations increased at an overwhelming pace.

An even more serious consequence of not having a plan in advance was that, for the first few months, everything moved on an ad-hoc basis along the line of least resistance - funds were flowing into unproductive directions where

employment could be provided easily without much preliminary preparation. Hence the large deployment to road works and metal breaking. Hence the marginal allocation to highly productive irrigation works while a relatively less productive work like soil conservation took almost 60% of the entire expenditure in the first six months. More than half the year was past before the plan and the underlying surveys and technical studies etc, were available for funds to flow in increasing volume towards the more productive types of relief works.

It turns out, therefore, that a plan can be an extremely useful instrument for ensuring that short term crises are tackled without disrupting long term programmes or aggravating long term problems. However, in order to derive the maximum benefit out of such a plan, it must be a contingency plan worked out carefully and completely well before the occurrence of drought, regardless of whether the drought will in fact occur or not. Moreover, this should not be a once for all exercise but an on going process where the plan itself keeps changing with the economic development of the region.

A convenient way, and perhaps the only practical way, of undertaking such contingency planning is to incorporate it as a part of the regular development planning process. And indeed it should be, since proper planning for rural

development should not be based on unrealistic assumptions about natural conditions but explicitly provide for the contingency of crop failures etc.

Lately great emphasis has been laid on special rural works programmes for creating employment, such as the CSRE (Crash scheme for rural employment). Maharashtra State itself has led the way with an Employment Guarantee Scheme for the unemployed. All these schemes have been designed to operate under normal conditions for productive employment of surplus labour which exists even when there are normal agricultural operations. Contingency planning can be incorporated into development by slightly reorienting these special employment schemes. Among other things, such reorientation would involve.

- a) That the deployment patterns of even such normal employment schemes be determined on the basis of the contingency planning criteria discussed in this study.
- b) That the employment schemes be worked out in sufficient detail and with adequate flexibility several years in advance, e.g. at the beginning of the five year plan; such that in the event of a drought or similar natural calamity, normal targets for two or three years can be quickly converted to contingency targets for a single year.

c) That similar flexibility be maintained with respect to the funding and logistics of these special employment schemes; such that they do not become bottlenecks if normal targets of several years are suddenly picked up as contingency targets in a single year.

In effect a plan for employing surplus labour during several years would become a plan for employing 'surplus' as well as normally employed labour in a single year if agricultural operations fail.

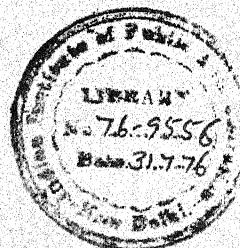
Through this method relief operation would be totally integrated as part of the development programme and contingency planning would become a part of normal development planning. Planning which provides well worked out alternatives for alternative 'states of the world' - which is really what a development plan should provide.

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